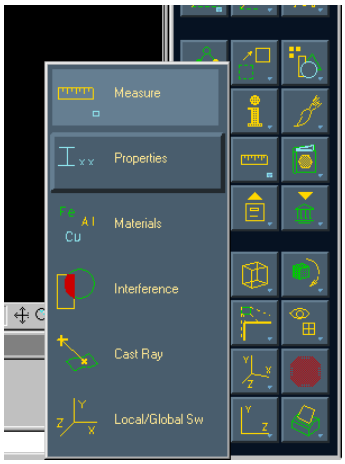
A Few Tips for Analyzing Your Mechanism in I-DEAS

The primary source of forces in your mechanism is due to the weight of the person rocking in the chair. There are a few steps that must be followed in order to properly account for the forces that result from weight of the chair components and the rider.

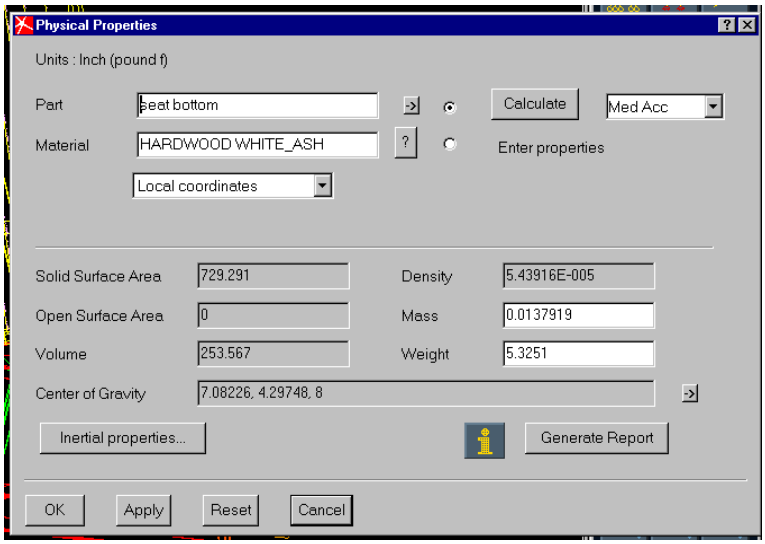
Make sure you have assigned materials to each component of the assembly using the *Properties* icon (The Ixx under the ruler. Remember how we assigned materials to the parts of the Engine Assembly. If it won't let you assign a material to a part you got from the library, make sure that you have permission to modify the part by checking the Library Status under the *Manage Bins* icon. Any item with a status of *Rfl* or *Rfs* cannot be modified. Change the library status to *Local Copy* for any instances that are *Rfl* or *Rfs*)

By default, I-DEAS will only consider the inertial forces that develop as a result of the motion of the mechanism. In order to account for the weight, gravity must be defined and included in the solution. Additionally, you will need to modify the inertial properties of the chair seat in order to simulate the weight of a typical rider.

First, simulate a 200 lb. rider by modifying the properties calculated for the seat bottom instance in the chair assembly you checked out of the library. Pick the properties icon (under the ruler icon used to measure things), and select the seat bottom as the entity for property calculation.



The *Physical Properties* form will display. Check the *Enter Properties* button and under *Weight*, increase the weight currently shown for the chair seat by 200 pounds to simulate a rider, then press *OK*

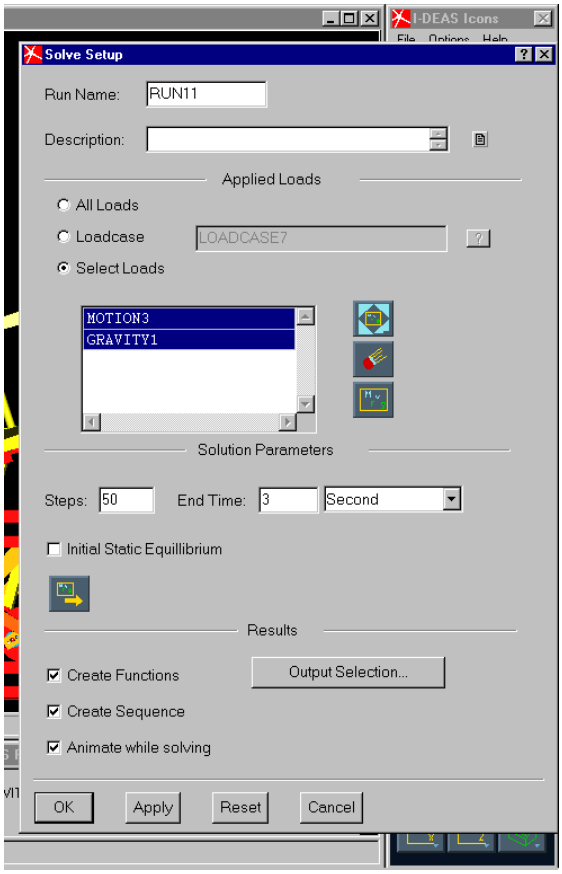


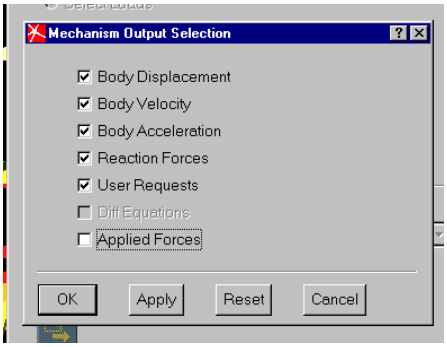
The next step is to create a gravity vector to include in the analysis. Pick the *Create Gravity* icon.

Respond to the questions in the *Prompt* region. A typical dialog looks like this:

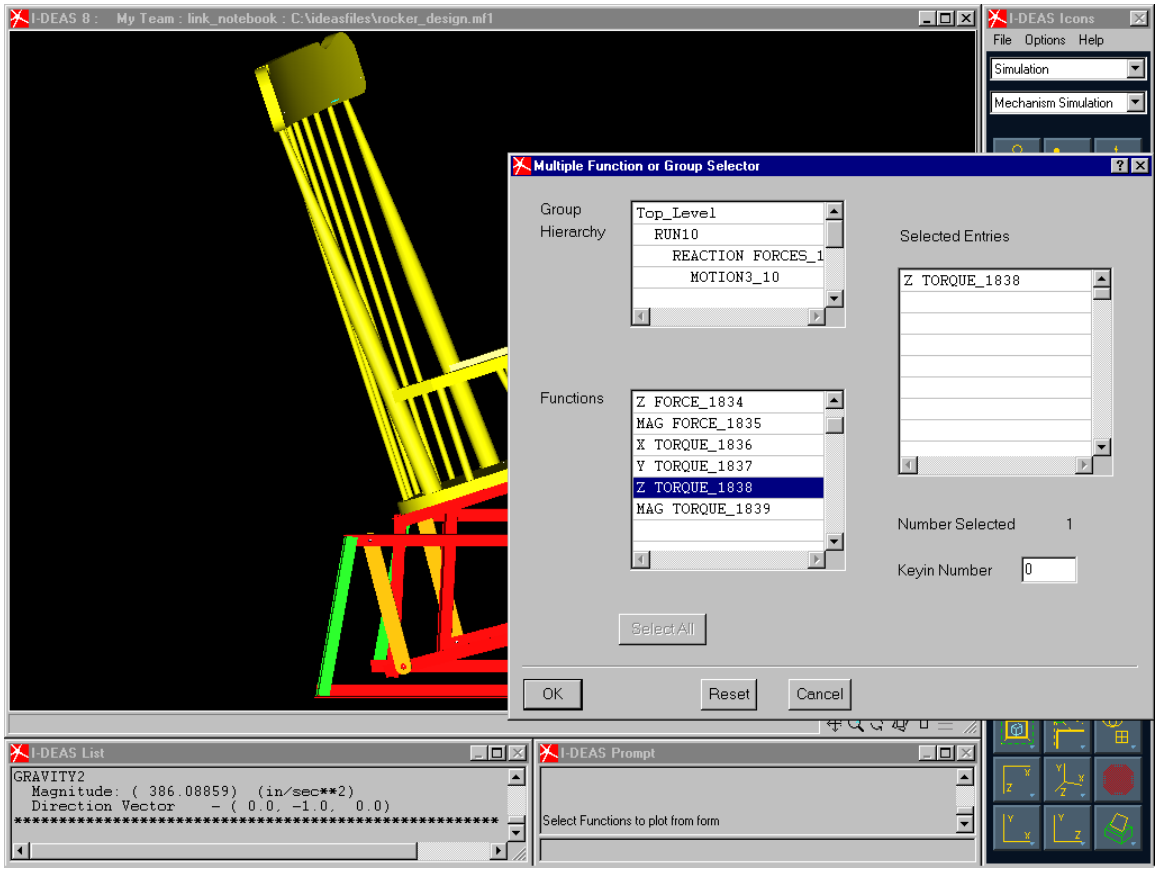
Enter GRAVITY name or no. (2-GRAVITY2) *Hit Enter*
Enter magnitude (386.0886) *Hit Enter*
Pick direction vector *Click right mouse button, select **Key in***
KEY
Enter direction vector XYZ of direction vector
0, -1, 0
Is the direction OK? (Yes)
Y

When you are ready to solve the mechanism, pick the *Select Loads* option button and highlight the motion statement you specified for the motor shaft joint and the gravity vector you defined. Also make sure you selected the *Reaction Forces* under the *Output Selection* button





The torque necessary to drive your mechanism can be found by plotting the reaction force for the motion statement that was applied to the motor shaft joint. Select the *Graph* icon and plot the Z_TORQUE corresponding to the motion definition.



The pin forces can be determined by plotting the X_FORCE and Y_FORCE reactions for the various revolute joints. Note that the force plotted represents the sum of the forces applied to the two physical joints in the prototype. When calculating the stresses in the links, only use half of the value from the plots. Be sure to include the plots of joint forces determined by I-DEAS in the Mechanism Analysis section of your report. Use the peak values to calculate the maximum stresses in the pins and links to see if they will withstand the forces.